

CLAIMS

1. A touch pad having:

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- a light transmissive means having a first surface adapted to receive light, the transmissive means being adapted to transmit received light inside the light transmissive means along the first surface,
- a first and a second means adapted to receive light received by the surface, transmitted along the first surface by the transmissive means, and for
- 10 outputting corresponding signals, and
- means for determining, on the basis of signals from the receiving means, a position of the first surface having received light.

15 2. A touch pad according to claim 1, further comprising a display or monitor, the monitor or display being positioned so as to provide or display information provided or displayed thereby through the first surface of the light transmissive means.

3. A touch pad according to any of the preceding claims, wherein the light transmissive
20 means comprises an at least substantially flat light transmissive member having at a surface thereof a light transmissive coating or layer, an upper surface of which forms the first surface of the light transmissive means.

4. A touch pad according to claim 3, wherein the member comprises a light transmissive
25 display or monitor

5. A touch pad according to any of the preceding claims, further comprising a flexible element positioned at or on the first surface and a light emitter adapted to transmit light into the flexible element, the element being adapted to have a part thereof depressed
30 toward the first surface and to direct light from the flexible element into the member at the depressed part.

6. A touch pad according to claim 5, wherein the flexible element has a first side comprising a number of predetermined first areas adapted to be depressed toward the
35 first surface and a second side having, at areas opposite to the predetermined first areas,

second areas which, in a first, non-depressed position, have a distance to the first surface and, in a second, depressed position, abut the first surface.

7. A touch pad according to claim 6, wherein the flexible element has, between the
5 second areas, means for preventing transmission of light from the flexible element to the first surface.
8. A touch pad according to claim 5, further comprising a depressing means having a first
10 side comprising a number of predetermined first areas adapted to be depressed toward the first surface and a second side having, at areas opposite to the predetermined first areas, depression elements which, in a first, non-depressed position, do not to any substantial degree depress the flexible member and, in a second, depressed position, depress the flexible member.
- 15 9. A touch pad according to claim 8, wherein the depressing means comprises an at least substantially stiff member being rotatable in relation to a remaining part of the depressing means, the stiff member having, at its first side, a plurality of the first areas and, at its second side, a plurality of the depression elements.
- 20 10. A touch pad according to any of the preceding claims, further comprising an element having a first side having a number of first predetermined positions for engagement of a user and a second side having a number of second positions or areas corresponding to the first positions, the element being adapted to, when a first position is engaged by the user, emit light from the corresponding second position, the second side being positioned
25 so that the light emitted may be received by the first surface.
11. A touch pad according to any of the preceding claims, wherein the receiving means comprise means for detecting light received at at least two different areas or points, the detecting means being adapted to determine an angle of incidence of detected light at
30 each area or point.
12. A touch pad according to claim 11, wherein the detecting means comprise at least one detector and, for each area or point, a reflecting means or lens means for directing the light received at the area or point on to the at least one detector.

13. A touch pad according to any of the preceding claims, wherein the receiving means comprise means for detecting light emitted at a predetermined point of the first surface in two different directions and means for determining the position of the predetermined point from the directions in which the light was detected.

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14. A touch pad according to claim 13, wherein the detecting means comprise at least one detector and reflecting means or lens means for directing the light emitted in the two different directions on to the at least one detector.

10 15. A touch pad according to any of claims 11-14, comprising at least two detectors each being at least one-dimensional detectors having a number of detecting points or areas, the detectors and reflecting/lens means being positioned so that light from two different points on the first surface are detected at different points/areas of at least one of the detectors.

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16. A touch pad according to claim 15, further comprising a plurality of slots or apertures provided between the predetermined point at the first surface and the one-dimensional detectors, the detecting points/areas of the one-dimensional detectors being at least substantially equidistant, and a distance between two adjacent slots being different from a

20 multipla of a distance between two adjacent areas/points of a detector.

17. A touch pad according to any of claims 11-16, wherein the at least one detector comprises a CCD detector.

25 18. A touch pad according to claim 17, wherein the CCD detector is a two-dimensional detector having a number of rows of detecting points/areas, and wherein each detector comprises at least one row of the CCD.

19. A touch pad according to claim 18, further comprising means for directing light from
30 surroundings of the touch pad to one or more other rows of the CCD.

20. A touch pad according to any of claims 11-19, wherein a filter means or the reflecting/lens means is adapted to transmit at least substantially only light within a predetermined wavelength interval.

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21. A touch pad according to any of the preceding claims, the pad further comprising a stylus or pen adapted to emit light from a point thereof, the stylus or pen being adapted to transmit light into the light transmissive means when touching and/or being translated over the first surface.

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22. A touch pad according to any of the preceding claims, further comprising means for receiving light from outside the pad and in a plane at least substantially parallel to the first surface and for transporting the light into the light transmissive means, the determining means being adapted to determine a position outside the pad from which the light is

10 emitted.

23. A touch pad according to claim 22, wherein the receiving means comprise at least two lens means or mirror means positioned so as to direct light from the outside of the pad along the plane into the light transmissive means.

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24. A touch pad according to claim 23, wherein the lens or mirror means form part of the light transmissive means.

25. A touch pad according to claim 23 or 24, further comprising means for directing light transported into the light transmissive means by the transporting means to the determining means.

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26. A touch pad according to any of the preceding claims, further comprising a stylus or pen having:

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- a first light transmitting channel along a predetermined axis of the stylus or pen,
- means for providing light into and along the transmitting channel,
- means for outputting the light from the transmitting channel,
- 30 - a receiving channel being adapted to receive light output from the transmitting channel and having been reflected outside the pen or stylus, and
- means for directing light from the receiving channel toward the receiving means of the pad.

27. A stylus for use in the touch pad according to any of the preceding claims, the stylus having a light providing means and means for emitting light provided from a point of the stylus.

5 28. A stylus according to claim 27, wherein the point of the stylus is flexible.

29. A stylus according to claim 27 or 28, wherein the light providing means is a light emitter.

10 30. A stylus according to any of claims 27-29, wherein the light providing means comprises means for receiving light from one or more surrounding light emitter(s).

31. A stylus according to any of claims 27-30, further having means for varying an intensity and/or wavelength of the light emitted, the variation being controlled by a
15 controlling means controllable by a user.

32. A stylus according to claim 31, wherein the controlling means comprises an area of the stylus, the area being adapted to be exposed to pressure or depression by the user, exposure to pressure or depression will make the controlling means vary the intensity
20 and/or wavelength.

33. A stylus or pen having:

- 25 - a first light transmitting channel along a predetermined axis of the stylus or pen,
- means for providing light into and along the transmitting channel,
- means for outputting the light from the transmitting channel,
- a receiving channel being adapted to receive light output from the transmitting channel and having been reflected outside the pen or stylus, and
- 30 - means for outputting the light from the receiving channel.

34. A method of operating a touch pad, the method comprising:

- 35 - providing a light transmissive means having a first surface adapted to receive light,

- receiving light at the first surface,
- transmitting the received light inside the light transmissive means along the first surface,
- receiving the transmitted light by a first and a second means,
- 5 - outputting, from the first and second means, corresponding signals, and
- determining, on the basis of signals from the receiving means, a position of the first surface having received light.

35. A method according to claim 34, further comprising a display or monitor providing or
10 displaying information through the first surface of the light transmissive means.

36. A method according to any of claims 34 or 35, wherein the comprising step comprises providing a light transmissive means comprising an at least substantially flat light transmissive member having at a surface thereof a light transmissive coating or layer, an
15 upper surface of which forms the first surface of the light transmissive means.

37. A method according to claim 36, wherein the providing step comprises providing a member comprising a light transmissive display or monitor

20 38. A method according to any of claims 34-37, the touch pad further comprising a flexible element positioned at or on the first surface and a light emitter, the light emitter transmitting light into the flexible element, the method comprising the step of depressing a part of the element toward the first surface and directing light from the flexible element into the member at the depressed part.

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39. A method according to claim 38, wherein the flexible element has a first side comprising a number of predetermined first areas adapted to be depressed toward the first surface and a second side having, at areas opposite to the predetermined first areas, second areas, the method comprising depressing one or more of the first areas and
30 bringing the one or more corresponding second areas from a first, non-depressed position in which the corresponding second area(s) have a distance to the first surface into a second, depressed position, where the corresponding second area(s) abut the first surface.

40. A method according to claim 39, further comprising the step of preventing transmission of light from the flexible element to the first surface between the second areas.

5 41. A method according to claim 38, wherein the touch pad comprises a depressing means having a first side comprising a number of predetermined first areas adapted to be depressed toward the first surface and a second side having, at areas opposite to the predetermined first areas, depression elements, the method comprising depressing one or more of the first areas of the depressing means so as to bring one or more of the
10 corresponding depression elements from a first, non-depressed position in which they do not to any substantial degree depress the flexible member to a second, depressed position in which they depress the flexible member.

42. A method according to claim 41, wherein the depressing means comprises an at least
15 substantially stiff member having, at its first side, a plurality of the first areas and, at its second side, a plurality of the depression elements, the method comprising rotating the stiff member in relation to a remaining part of the depressing means so as to bring one or more second areas from the first to the second positions.

20 43. A method according to any of claims 34-42, the touch pad further comprising an element having a first side having a number of first predetermined positions for engagement of a user and a second side having a number of second positions or areas corresponding to the first positions, the method comprising the step of, when a first position is engaged by the user, emitting light from the corresponding second position and
25 receiving the emitted light by the first surface.

44. A method according to any of claims 34-43, wherein the detecting step comprises detecting light received at at least two different areas or points, the determining step comprising determining an angle of incidence of detected light at each area or point.

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45. A method according to claim 44, wherein the touch pad comprises at least one detector, the method comprising the step of directing, using a reflecting means or lens means, the light received at the area or point on to the at least one detector.

46. A method according to any of claims 34-45, wherein the detecting and determining steps comprise detecting light emitted at a predetermined point of the first surface in two different directions and determining the position of the predetermined point from the directions in which the light was detected.

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47. A method according to claim 46, wherein the touch pad comprises at least one detector, the method comprising directing, using reflecting means or lens means, the light emitted in the two different directions on to the at least one detector.

10 48. A method according to any of claims 44-47, wherein the touch pad comprises at least two detectors, each detector being at an least one-dimensional detector having a number of detecting points or areas, the method comprising the step of detecting light emitted from two different points on the first surface at different points/areas of at least one of the detectors.

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49. A method according to claim 48, further comprising the step of providing a plurality of slots between the predetermined point at the first surface and the one-dimensional detectors, the detecting points/areas of the one-dimensional detectors being at least substantially equidistant, and a distance between two adjacent slots being different from a
20 multipla of a distance between two adjacent areas/points of a detector.

50. A method according to any of claims 44-49, the touch pad comprising a two-dimensional CCD detector having a number of rows of detecting points/areas, wherein the detecting step comprises detecting light transmitted by the transmissive means by one or
25 more of the rows of detecting points/elements.

51. A method according to claim 50, the method further comprising the step of directing light from surroundings of the touch pad to one or more other rows of the CCD.

30 52. A method according to any of claims 50-51, further comprising the step of transmitting at least substantially only light within a predetermined wavelength interval.

53. A method according to any of claims 34-52, wherein the step of providing the light comprises providing a stylus or pen emitting light from a point thereof and transmits light

into the light transmissive means when touching and/or being translated over the first surface.

54. A method according to any of claims 34-53, further comprising the steps of:

- 5 - receiving light from outside the pad and in a plane at least substantially parallel to the first surface and
- transporting the light into the light transmissive means,
- the determining step comprising determining a position outside the pad from which the light is emitted.

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55. A method according to claim 54, further comprising providing at least two lens means or mirror means positioned so as to direct light from the outside of the pad along the plane into the light transmissive means.

- 15 56. A method according to claim 55, wherein the steps of providing the light transmissive means and the lens or mirror means comprises providing the light transmissive means and the lens/mirror means as a single element.

57. A method according to claim 55 or 56, further comprising the step of directing light
20 transported into the light transmissive means by the transporting means to the determining means.

58. A method according to claim 54, the method comprising translating a stylus or pen having:

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- a first light transmitting channel along a predetermined axis of the stylus or pen,
- means for providing light into and along the transmitting channel,
- means for outputting the light from the transmitting channel,
- 30 - a receiving channel being adapted to receive light output from the transmitting channel and having been reflected outside the pen or stylus,
- means for directing light from the receiving channel toward the receiving means of the pad

over a surface having areas of varying light reflection, the light or stylus directing light of varying intensity toward the touch pad,

wherein the determining step comprises determining information from the variation in the
5 light intensity.

59. A method according to any of claims 34-58, the method comprising providing light at the first surface using a stylus or pen, the method further comprising the step of varying an intensity and/or wavelength of the light emitted, the variation being controlled by a
10 controlling means controllable by a user, and wherein the determining step comprises detecting the variation.

60. A method according to claim 59, wherein the varying step comprises the user depressing an area of the stylus, the depression facilitating the variation of the intensity
15 and/or wavelength.